REMARKS

Upon entry of the present Amendment-B the claims in the application are claims 1-17, of which claims 1, 7 and 13 are independent. Claim 1 is amended herein to overcome an informality noted by the Examiner, and new claims 13-17 are added to the application.

Applicant respectfully submits that all of the above amendments are fully supported by the original application. Applicant also respectfully submits that the above amendments do not introduce any new matter into the application.

After careful consideration of the objections and rejections set forth in the Office Action, applicant respectfully submits that as amended, all pending claims patentably distinguish over the art of record, and requests allowance of all pending claims, as discussed further below.

In the Claims

Claim Objections

At item 4 of the Office Action, the Examiner objected to claims 1-6 because of informalities. Specifically, a grammatical error is noted in claim 1. Per the suggestion of the Examiner, claim 1, line 7 has been amended herein to recite –operates in order--. This amendment to claim 1 obviates the objection of the Examiner, and it is respectfully requested that the objection be reconsidered and withdrawn..

Claim Rejections – 35 USC 102

1. At item 6 of the Office Action, the Examiner has rejected claims 1-12 under 35 U.S.C. 102(b) as anticipated by Naito et al (US Patent 5,557,552). With reference to claims 1 and 7, the

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Examiner states that Naito discloses an apparatus and method for measuring vehicle speed including sensors which detect vibrations at front and rear wheels, and input signals to a processing unit whereby features of the signal are extracted and a time difference is used in combination with a known reference distance to calculate the speed of a vehicle. The Examiner states that the processing unit performs filtering and correlation functions on the sensor signals prior to calculating the vehicle speed.

<u>Applicant's Response</u>

Upon careful review of Naito and comparison of Naito's disclosure to the present claims, applicant respectfully traverses such rejection and submits that claims 1-12 are patently distinct over Naito's system, since Naito does not disclose every feature claimed by the applicant.

Naito discloses a wheel speed sensor for each wheel which includes a magnetic toothed wheel attached to the corresponding axle sensed by an adjacent pickup coil, the frequency of the resulting alternating signal indicating the speed of the wheel. Output from the wheel speed sensors is also used to determine vibration components acting on the front and rear wheels due to road surface irregularities, and the phase delay between an irregularity sensed by the front wheel and the same irregularity as sensed by the rear wheel is calculated, either by performing a Fourier transform on the respective sensor signals and developing a correlation between the signals, or by measurement in a comparison of distinctive signal waveforms. The absolute vehicle speed is calculated by dividing the wheel base L by the phase delay.

As will be understood, such system is distinct from applicant's claimed vehicle speed measuring apparatus. For example, although Naito discloses a comparison of waveforms to determine the phase delay between front and rear wheel signals, Naito does not disclose

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exclusion of inherent tire influences on the detection values (sensor data) *when the values are input to the processor,* as recited in claim 1. In the disclosed embodiment, applicant accomplishes this exclusion by passing the sensor signal through a digital filter 12. In contrast, Naito does not disclose a device or method step for excluding the influence of characteristics of the individual tire on the wheel speed signal, and (although Naito monitors tire conditions of each wheel of the vehicle) is silent as to the effect of inherent tire influences on the sensor data, or the calculated vehicle speed.

In this regard, although the Examiner states that the processing unit performs filtering and correlation functions on the sensor signals prior to calculating the vehicle speed, the applicant respectfully disagrees with this interpretation of Naito because it is not supported by Naito's actual disclosure. In the rejection, the Examiner refers to column 7, lines 13-31 of Naito to substantiate that the processing unit performs filtering and correlation functions on the sensor signals prior to calculating the vehicle speed. However, this portion of the disclosure is referring to a process in which the absolute vehicle speed is calculated by performing a Fourier transform on the respective sensor signals. In this method, no pattern matching is performed (as recited in claims 1 and 7), and thus this embodiment of Naito does not anticipate this requirement of the claimed invention.

Moreover, while Naito discusses use of a "narrow-bandwidth filter" at his col. 7, lines 25-31, such filter is not for exclusion of inherent tire influences on detection values as presently claimed, but for selecting between two different vibration ranges A, B, i.e., the vertical and longitudinal components of unsprung vibration.

It is noted that Naito discloses an alternative method whereby calculation of the vehicle

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speed by measurement in a comparison of distinctive signal waveforms, in which pattern matching is disclosed, but no filtering and correlation functions are associated with this alternative method. Prior to calculating vehicle speed, Naito performs a comparison of the wheel speed with a predetermined value for the purpose of determination of the presence of signal increase due to a road surface irregularity, e.g., at the paragraph bridging his cols. 7-8. However, this comparison is not equivalent to a performing filtering and/or correlation function on the sensor signal, and furthermore does not address the effect of inherent tire influences on the detection values. Thus, this alternative embodiment of Naito also fails to anticipate the applicant's invention.

Further, applicant respectfully submits that Naito fails to disclose or suggest features of the dependent claims. With reference to claims 5-6 and 11-12, for example, the Examiner states that Naito discloses the processes performed by the processing unit as continuous and would thus reflect the average speed over varying vehicle speeds.

As regards claims 5 and 11, the applicant respectfully disagrees that Naito discloses calculation of an average vehicle speed based on multiple calculated vehicle speeds. The applicant further disagrees with the Examiner's assertion that since processes of the processing unit are continuously performed, the resulting calculated vehicle speeds reflect an average speed. This assertion has no basis in the disclosure of Naito, and the applicant respectfully submits that the Examiner is attempting to improperly generalize the disclosure of Naito to meet the specific claimed limitations of the applicant's invention.

As regards claims 6 and 12, the applicant respectfully disagrees that Naito discloses a feature extraction operation of the processing unit which varies based on vehicle speed. For

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example, the applicant discloses the digital filter constructed so that as the wheel speed increases, the wheel speed variation at a higher frequency band passes through the digital filter. The applicant also discloses that the data sampling interval becomes short at higher vehicle speeds, and when the vehicle speed is low the sampling interval becomes relatively long and a large number of detection values are stored. In contrast, Naito merely discloses a comparison of distinctive waveforms appearing on the detected signals so as to calculate a phase difference between front and rear wheels, and does not disclose a processing variation depending on vehicle speed. Thus, the limitations of claims 6 and 12 are not anticipated or suggested by Naito.

Based on the foregoing, applicant respectfully submits that the Examiner has not established prima facie anticipation of the subject matter of claims 1-12 in light of the Naito reference, and it is respectfully requested that the rejection of claims 1-12 based on the Naito reference be reconsidered and withdrawn.

2.   At item 7 of the Office Action, the Examiner has rejected claims 1, 3, 5-7 and 9-11 under 35 U.S.C. 102(b) as anticipated by Alcone et al (5,301,130). With reference to claims 1 and 7, the Examiner states that Alcone discloses an apparatus and method for measuring vehicle speed which includes sensors which detect vibrations at front and rear wheels, and inputs signals to a processing unit whereby features of the signal are extracted and a time difference is used in combination with a known reference distance to calculate the speed of a vehicle. The Examiner states that the processing unit performs an adaptive noise cancellation algorithm to analyze and correlate features of the sensor signals prior to calculating the vehicle speed.

Applicant's Response

Upon careful review of Naito and comparison of Alcone's disclosure to the present

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claims, applicant respectfully traverses such rejection and submits that claims 1, 3, 5-7 and 9-11 are patently distinct over Alcone's system, since Alcone does not disclose every feature claimed by the applicant.

From review of Alcone, the applicant finds that Alcone discloses an apparatus for measuring the absolute velocity of a vehicle for improved function of the antilock braking system. In the disclosed apparatus, the vertical acceleration of the front and rear wheels is measured using accelerometers mounted to the respective wheels. The vertical acceleration of the front wheel is compared to the vertical acceleration of the rear wheel to determine the time lag between the front and rear wheels. Specifically, the time lag is determined using an adaptive noise cancellation algorithm which iteratively determines the delay between front and rear wheel signals. The forward speed of the vehicle is calculated from this time lag and the wheel base of the vehicle.

For example, Alcone discloses use of the adaptive noise cancellation algorithm to determine the phase delay between front and rear wheel signals rather than pattern extraction and pattern matching between front and rear wheel sides, as recited by the applicant in claims 1, 7.

Further, Alcone does not disclose exclusion of inherent tire influences on the detection values (sensor data) *when the values are input to the processor*, as recited in claim 1 and 7. Again, in the disclosed embodiment applicant accomplishes this exclusion by passing the sensor signal through a digital filter 12. In contrast, Alcone does not disclose a device or method step for excluding the influence of characteristics of the individual tire on the wheel speed signal, and is silent as to the effect of inherent tire influences on the sensor data, or the calculated vehicle speed. Thus, Alcone does not anticipate the features of claims 1 and 7.

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As regards dependent claims 5-6 and 11-12, the Examiner states that Alcone discloses the processes performed by the processing unit as continuous and would thus reflect the average speed over varying vehicle speeds.

With respect to claims 5 and 11, the applicant respectfully disagrees that Alcone discloses calculation of an average vehicle speed based on multiple calculated vehicle speeds. The applicant further disagrees with the Examiner's assertion that since processes of the processing unit are continuously performed, the resulting calculated vehicle speeds reflect an average speed. This assertion has no basis in the disclosure of Alcone, and it appears that the Examiner is again attempting to improperly generalize the disclosure of Alcone to meet the specific claimed limitations of the applicant's invention.

With respect to claims 6 and 12, the applicant respectfully disagrees that Alcone discloses a feature extraction operation of the processing unit which varies based on vehicle speed. For example, the applicant discloses the digital filter constructed so that as the wheel speed increases, the wheel speed variation at a higher frequency band passes through the digital filter. The applicant also discloses that the data sampling interval becomes short at higher vehicle speeds, and when the vehicle speed is low the sampling interval becomes relatively long and a large number of detection values are stored. In contrast, Alcone discloses the adaptive noise cancellation algorithm which calculates an estimate of the gradient of the difference between the front and rear accelerometer signals, and thus is independent of vehicle speed. Thus, the limitations of claims 6 and 12 are not anticipated or in any way suggested by Alcone.

Based on the foregoing, applicant respectfully submits that the Examiner has not established prima facie anticipation of the subject matter of claims 1, 3, 5-7 and 9-11 in light of

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the Alcone reference, and it is respectfully requested that the rejection based on the Alcone reference be reconsidered and withdrawn.

Other Matters

The additional references cited by the Examiner on the form PTO-892 attached to the Office Action, US Patents 5,826,207 and 6,142,026 to Ohashi et al., US Patent 4,961,643 to Sakai et al., and US Patent 5,644,490 to Weber, have been considered by applicant, but it is respectfully submitted that these additional references fail to overcome the deficiencies of the Naito and Alcone references as discussed above in relation to claim 1-12.

New claims 13-17 are added to the application. Claim 13 is a new independent apparatus claim similar to claim 1 but which defines structural limitations rather than functional limitations of the apparatus. New claims 14 and 15 depend from claim 13, and are similar to claims 5 and 6, respectively. New claims 16 and 17 also depend from claim 13. Claim 16 recites a feature in which the data normalization unit acts to remove the vehicle speed component from the detection values. Claim 17 recites the first-in, first-out property of the vehicle speed memory. These features are completely supported by the specification, and are not disclosed by the cited prior art references, or any combination thereof.
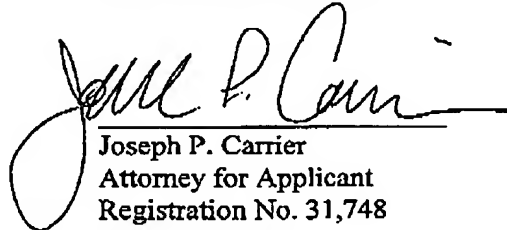
Conclusion

Based on all of the foregoing, applicant respectfully submits that all of the objections and rejections set forth in the Office Action are overcome, and that as presently amended, all of the pending claims are believed to be allowable over all of the references of record, whether considered singly or in combination. Applicant requests reconsideration and withdrawal of the rejections of record, and allowance of the pending claims.

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If the Examiner is not fully convinced of all of the claims now in the application, applicant respectfully requests that he telephonically contact applicant's undersigned representative to expeditiously resolve prosecution of the application.

Favorable consideration is respectfully requested.

Respectfully submitted,

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I hereby certify that this correspondence is being sent via facsimile transmission to the US Patent & Trademark Office on May 17, 2005.

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